

Trauma Centre Performance Evaluation: Statistics and Confidence Interval

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Outline:

- TC performance evaluation:
compare observed to expected outcomes, good (bad) performance has less (more) observed mortality
- Three statistics: Z , W , O/E with CI
- Assess how well three statistics agree with each other:
a real study

Three Statistics for Trauma Centre Performance Evaluation

- Z : standardize the observed cases

$$Z = \frac{O - E}{\sqrt{\text{var}(O)}}$$

- Good performance: $Z < -1.96$
- Bad performance: $Z > +1.96$

- W : measures the excess cases per 100 patients

$$W = \frac{O-E}{N/100}$$

$$CL = W \pm 1.96\sqrt{\text{var}(W)} = W \pm 1.96\frac{\sqrt{\text{var}(O)}}{N/100}$$

- Good performance: $UCL < 0$
- Bad performance: $LCL > 0$

- O/E : estimates the ratio of observed to expected cases (easy interpretation)

$$LCL = [\chi^2_{2o}]\alpha / 4$$

$$UCL = [\chi^2_{2(o+1)}](1 - \alpha / 2) / 2$$

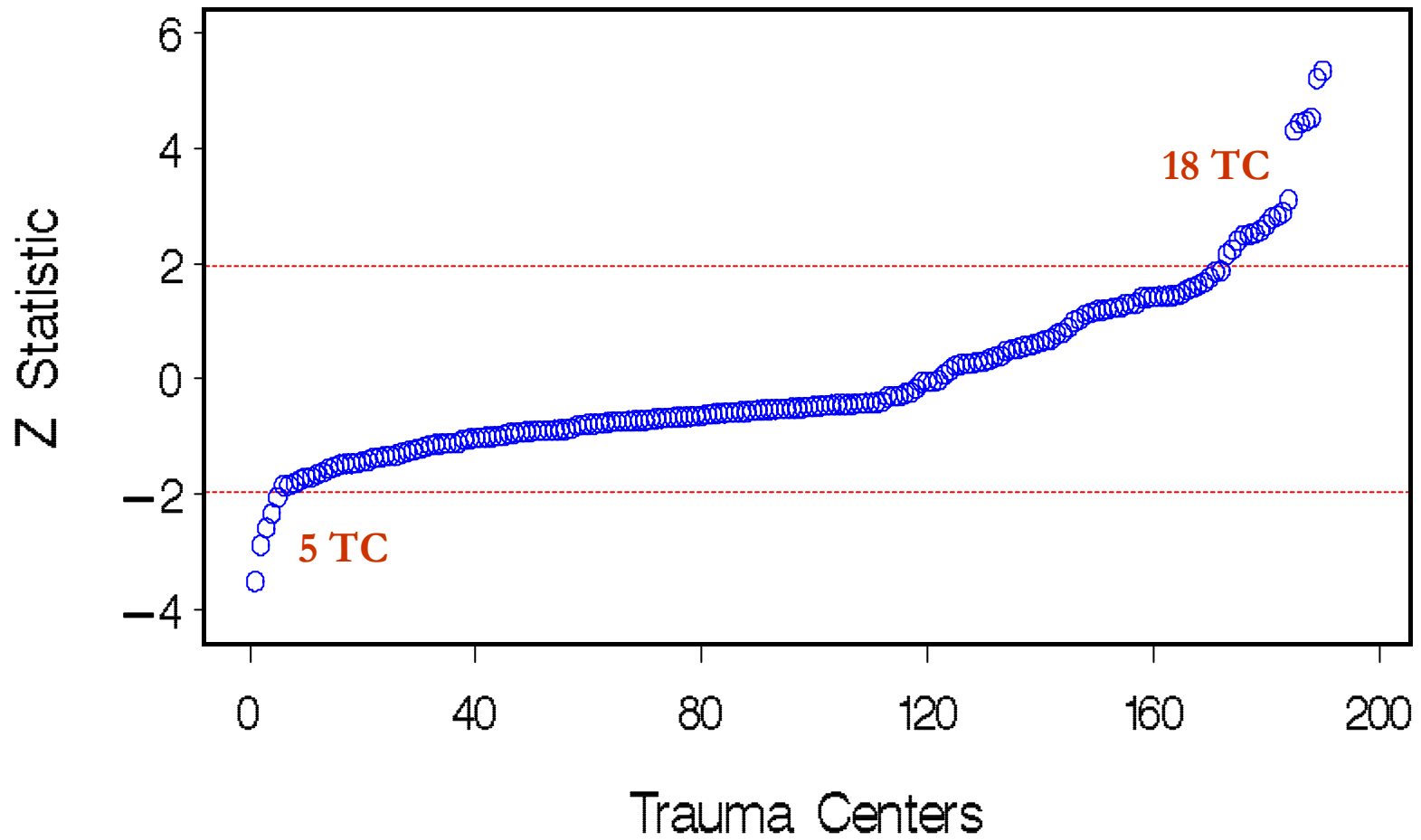
(Am J Epidemiol 1990; 131: 373-5)

- Good performance: $UCL < 1$
- Bad performance: $LCL > 1$

Retrospective/NTDB (2003-2005)

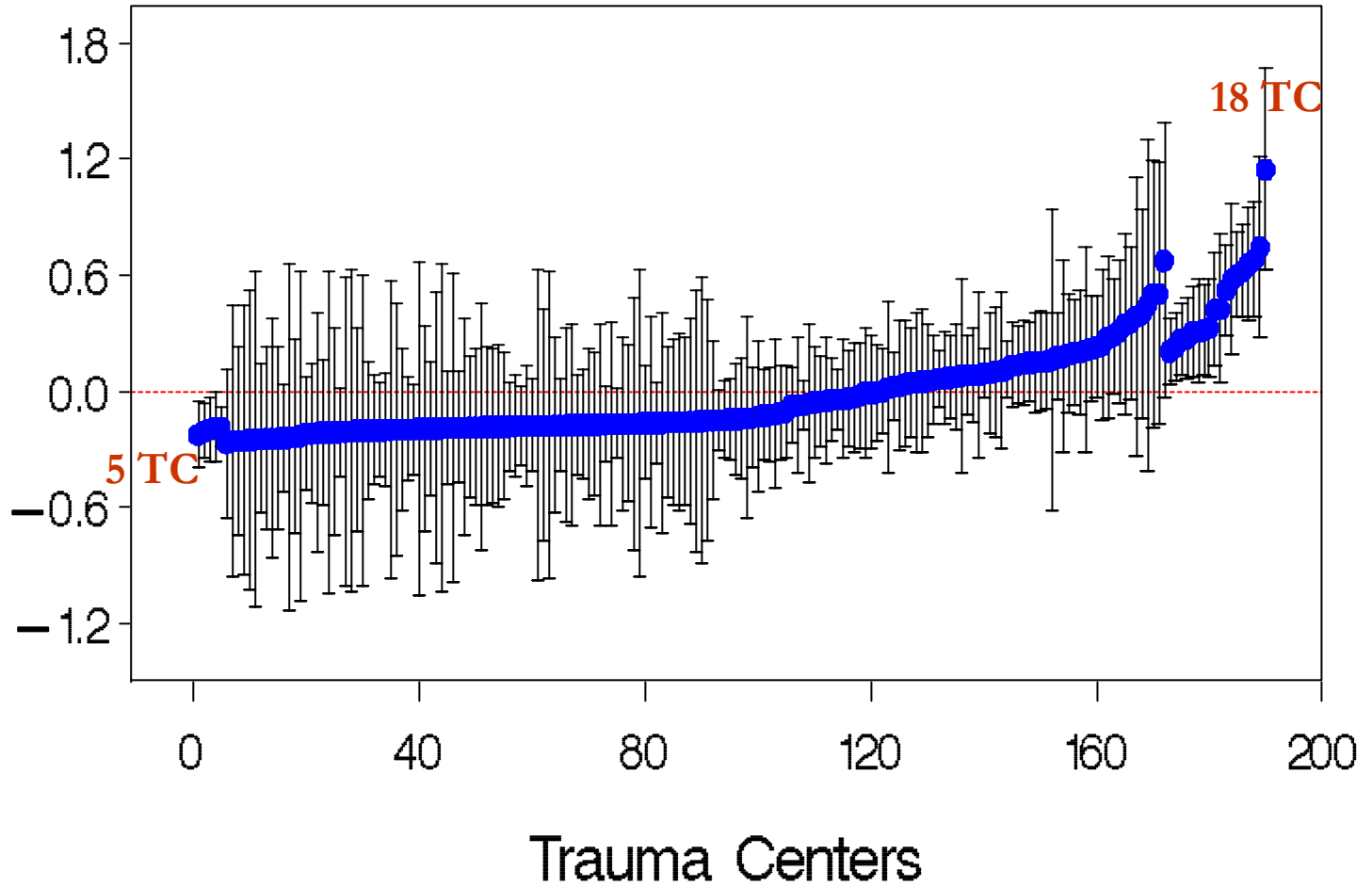
- Age 18-84, ISS \geq 9, excludes burns and <100 patients
- 181,751 patients in 190 centers
- Outcome: VTE = DVT + PE

Z Score for PE

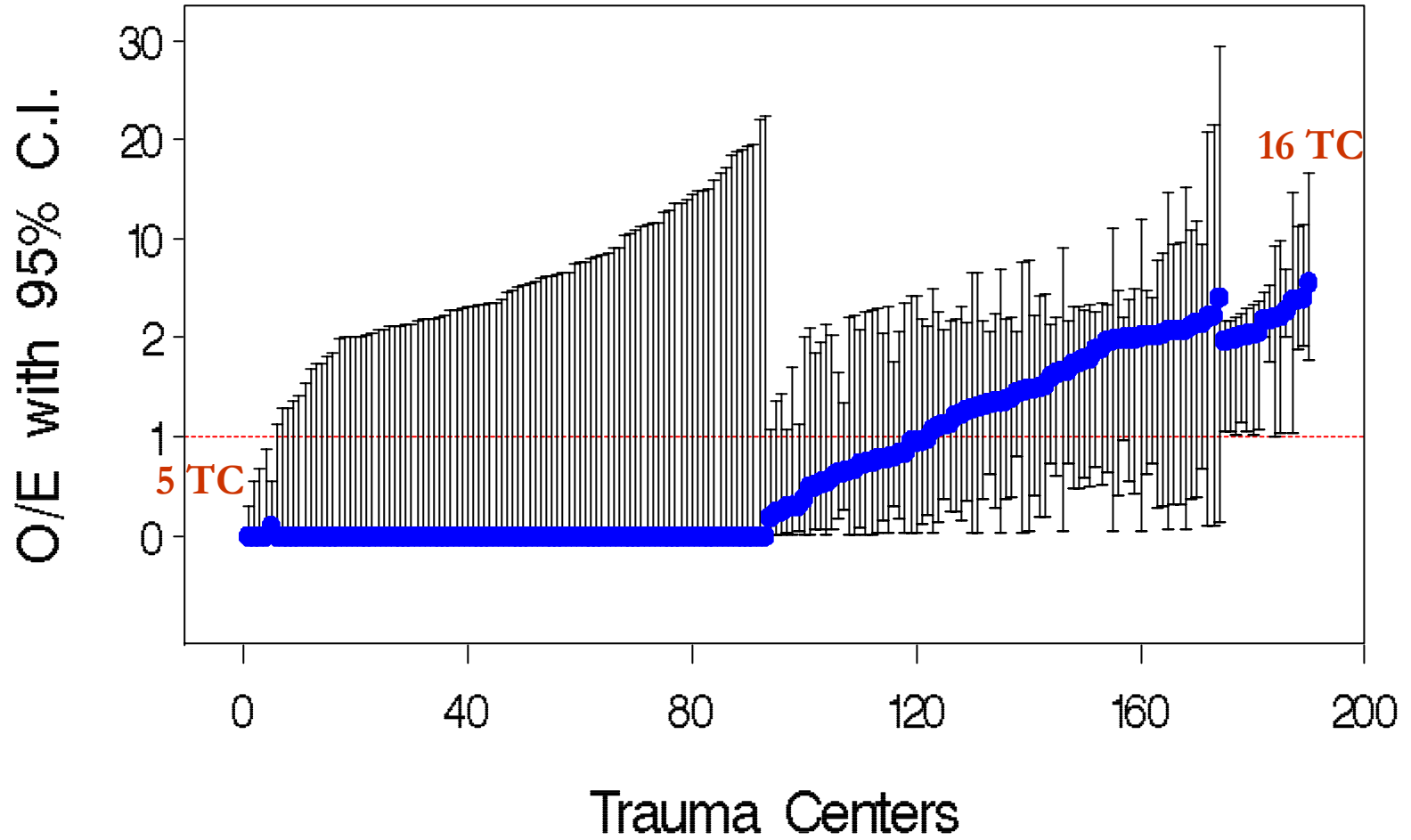


W Score for PE

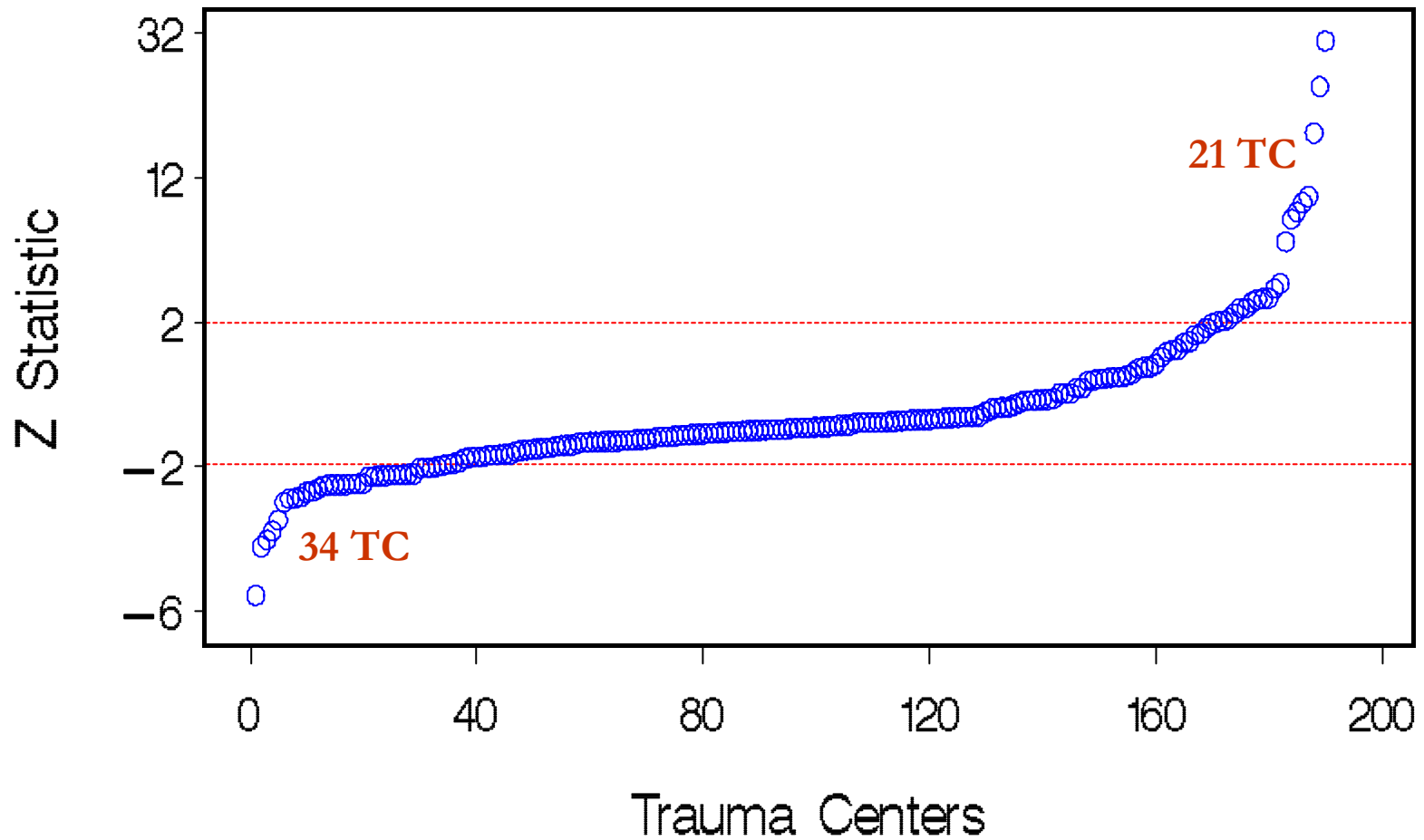
W with 95% C.I.



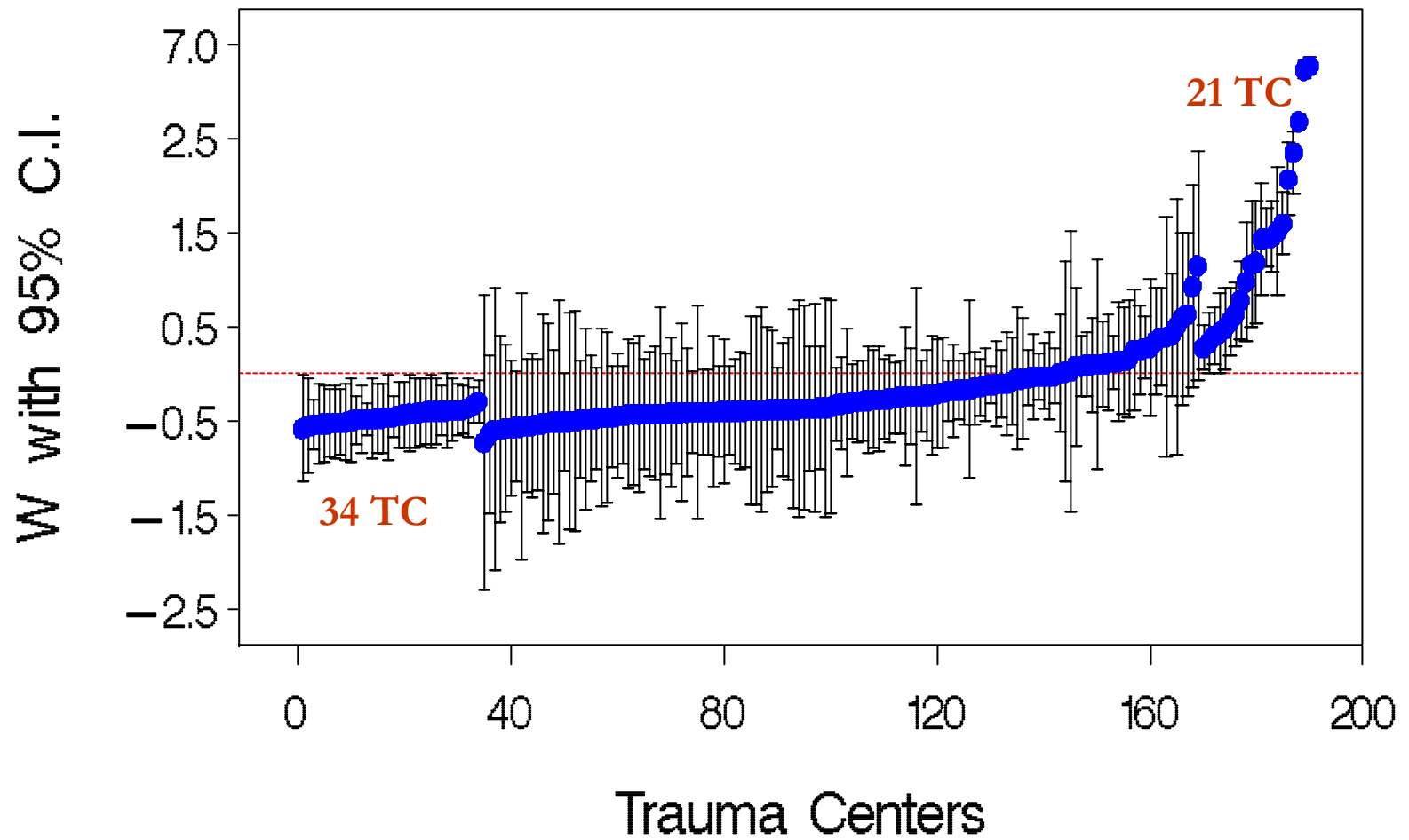
O/E Ratio for PE



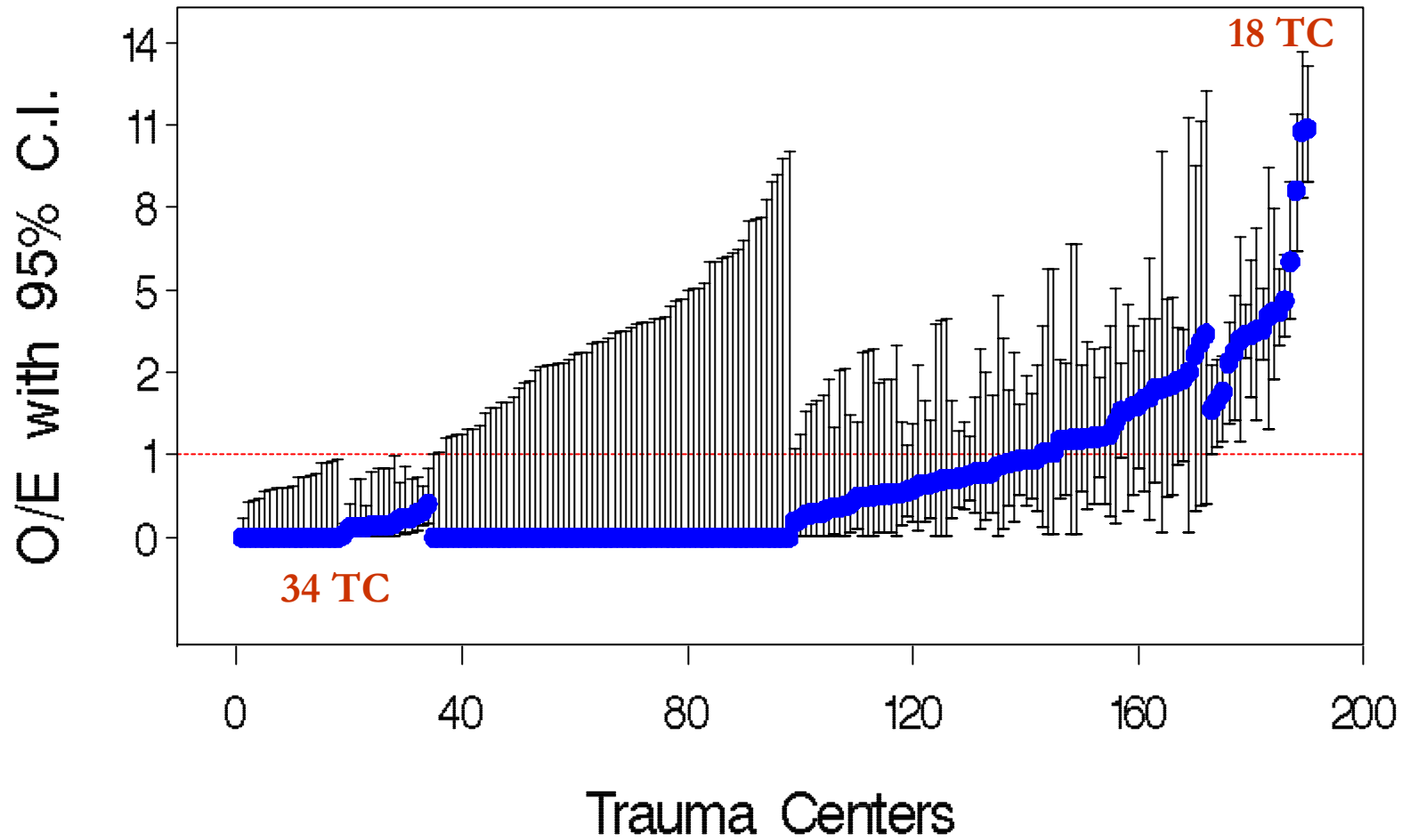
Z Score for DVT



W Score for DVT



O/E Ratio for DVT



Conclusions:

- Z and W are commonly used for evaluating TC performance. A new trend of using O/E for easy interpretation
- Concordance between Z and W is perfect ($\kappa = 1.00$), concordance between Z and O/E is excellent ($1.00 \geq \kappa > 0.91$)
- All three statistics can be used to evaluate TC performance
- Further work involves validation of the three statistics in other datasets